



Attorney Docket No. 0756-1896

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Hisashi OHTANI et al.
Serial No. 09/197,767
Filed: November 23, 1998
For: SEMICONDUCTOR DEVICE AND
PROCESS FOR PRODUCING THE
SAME

) Group Art Unit: 2814
) Examiner: P. Cao
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) Adeline M. Stamps

RESPONSE

Honorable Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The Official Action mailed July 14, 2004, has been received and its contents carefully noted. Filed concurrently herewith is a *Request for One Month Extension of Time*, which extends the shortened statutory period for response to November 14, 2003. Accordingly, the Applicants respectfully submit that this response is being timely filed.

The Applicants note with appreciation the consideration of the Information Disclosure Statements filed on March 16, 2000, June 14, 2000, October 19, 2000, January 31, 2001, October 31, 2001, February 28, 2002, June 13, 2002, May 2, 2003, November 10, 2003, and April 19, 2004.

Claims 1-5, 16, 22-27, 40 and 46-74 are pending in the present application, of which claims 1-5 and 47-50 are independent. For the reasons set forth in detail below, all claims are believed to be in condition for allowance. Favorable reconsideration is requested.

Paragraph 1 of the Official Action rejects claims 1, 2, 5, 16, 22-27, 40, 47, 48, 51, 52, 55, 56, 59, 60, 63, 64, 67, 68, 71 and 72 under 35 U.S.C. § 112, first paragraph, asserting that the claims fail to comply with the written description requirement.

Specifically, the Official Action asserts that "having a flat upper surface thereon" is not supported by the original disclosure. The Applicants respectfully disagree and traverse the above-referenced assertions.

The Applicants respectfully submit that the feature of a reflective pixel electrode having a flat upper surface thereon is supported in the specification, for example, at page 6, line 30, to page 7, line 1 and at page 12, lines 12-19 (referring to Figure 1C). Therefore, the Applicants respectfully submit that claims 1, 2, 5, 16, 22-27, 40, 47, 48, 51, 52, 55, 56, 59, 60, 63, 64, 67, 68, 71 and 72 are adequately described in the specification. Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. § 112 are in order and respectfully requested.

Paragraph 2 of the Official Action continues to reject claims 1, 47, 51, 55, 59, 63, 67, 68, 71 and 72 as obvious based on the combination of U.S. Patent No. 5,536,950 to Liu et al., U.S. Patent No. 5,706,064 to Fukunaga et al. and U.S. Patent No. 6,400,428 to Izumi. Paragraph 3 of the Official Action continues to reject claims 2, 22-27, 40, 48, 52, 56, 60 and 64 as obvious based on the combination of Liu, U.S. Patent No. 5,990,542 to Yamazaki, Fukunaga and Izumi. Paragraph 7 of the Official Action continues to reject claims 5, 16, 22-27, 40 and 46 as obvious based on the combination of Liu, Fukunaga and Izumi. Paragraph 8 of the Official Action continues to reject claims 1, 2, 5, 22-27, 40, 47, 48, 51, 52, 55, 56, 59, 60, 63, 64, 67, 68, 71 and 72 as obvious based on the combination of Fukunaga, Liu and Izumi.

There is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify Liu and Izumi or to combine reference teachings to achieve the claimed invention. MPEP § 2142 states that the examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. It is respectfully submitted that the Official Action has failed to carry this burden. While the Official Action relies on various teachings of the cited prior art to disclose aspects of the claimed invention and asserts that these aspects could be used together, it is submitted that the Official Action does not

adequately set forth why one of skill in the art would combine the references to achieve the features of the present invention.

In the "Response to Arguments" section, the Official Action asserts that "the combined teachings of the references would have suggested to those of ordinary skill in the art [to combine Liu and Izumi] because Izumi clearly suggests that the display device electrode of Liu can have a pixel electrode made of either a transparent electrically conductive film or a reflective electrically conductive film depending upon the display device which is desired for the liquid crystal display device" (page 12, Paper No. 0704). The Applicants respectfully disagree.

Liu discloses the following: (1) that an aperture ratio is an important factor influencing a power requirement of an AMLCD and has an object of increasing the aperture ratio (see column 1, lines 29-33, and column 2, lines 62-65); (2) that a transparent metal (ITO) is used as a pixel electrode (see column 5, lines 40-41); and (3) that a high aperture ratio is achieved by their invention, and that the high aperture ratio allows use of a lower power backlight. In view of these disclosures, it is clearly understood that Liu's liquid crystal display device is a transmission type liquid crystal display device. Even though Izumi appears to disclose that a pixel electrode may be a transparent electrically conductive film or a reflective electrically conductive film (see column 6, lines 15-19), this is not sufficient, in and of itself, to suggest that the entire device of Liu should be changed in a manner which would obviate the stated object of the invention, that is, changing the pixel electrode of Liu into a reflective pixel electrode. In other words, even though the Izumi device may use a transparent electrically conductive film or a reflective electrically conductive, this is not sufficient to teach that a transparent electrically conductive film or a reflective electrically conductive film could be used in any device, particularly in the Liu device, where use of a transmission type LCD is one of the objects of the invention.

Fukunaga and Yamazaki do not cure the deficiencies in the alleged motivation to combine Liu and Izumi. The Official Action relies on Fukunaga to allegedly teach the

features of an embedded conductive layer made of ITO or ZnO (page 3, Paper No. 0704) and on Yamazaki to allegedly teach forming an interlayer insulating film made of organic resin (page 4, Id.). Fukunaga and Yamazaki do not teach or suggest that it would have been obvious to one of ordinary skill in the art at the time of the invention to change the pixel electrode of Liu into a reflective pixel electrode.

In the present application, it is respectfully submitted that the prior art of record, alone or in combination, does not expressly or impliedly suggest the claimed invention and the Official Action has not presented a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.

Furthermore, with respect to independent claim 5, the prior art, either alone or in combination, does not teach or suggest all the features of the independent claims. Liu, Fukunaga, Izumi and Yamazaki, either alone or in combination, do not teach or suggest that an embedded conductive layer comprises a same resin as a resin of an interlayer insulating film. Since Liu, Fukunaga, Izumi and Yamazaki do not teach or suggest all the claim limitations, a *prima facie* case of obviousness cannot be maintained.

For the reasons stated above, the Official Action has not formed a proper *prima facie* case of obviousness. Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. § 103(a) are in order and respectfully requested.

Paragraph 4 of the Official Action rejects claims 3, 22-27, 40, 49, 53, 57, 61, 65, 69, 70, 73 and 74 as obvious based on the combination of U.S. Patent 6,081,305 to Sato et al., U.S. Patent 6,097,453 to Okita, Fukunaga and U.S. Patent No. 5,644,370 to Miyawaki et al. Paragraph 5 of the Official Action rejects claims 4 and 50 as obvious based on the combination of Sato, Okita, Miyawaki and Yamazaki. Paragraph 6 of the Official Action rejects claims 54, 58, 62 and 66 as obvious based on the combination of Sato, Okita, Miyawaki, Yamazaki and Fukunaga.

The prior art, either alone or in combination, does not teach or suggest all the features of the independent claims. Independent claims 3, 4, 49 and 50 recite a contact

hole opened through third and second interlayer insulating films to reach a drain electrode, an embedded conductive layer filled in the contact hole, a reflective pixel electrode formed on the third interlayer insulating film, where the reflective pixel electrode is electrically connected to a drain electrode through the embedded conductive layer. In other words, the embedded conductive layer is formed in the contact hole, and then the reflective pixel electrode is formed over the embedded conductive layer. The Official Action asserts that Sato teaches "an embedded conductive layer filled in the contact holes" (page 6, Paper No. 0704). The Applicants respectfully disagree.

The Applicants note that in the Interview Summary dated June 6, 2003, the Official Action conceded that "the Sato reference does not suggest the surface of embedded conductive layer that is flush with the top surface of the insulating film" (Paper No. 34). The Applicants further submit that Sato does not teach or suggest that an embedded conductive layer is formed, and then a reflective pixel electrode is formed over the embedded conductive layer. Although Figures 2 and 3 of Sato show a line between the portion of electrode 181 formed in the third metal layer (wiring layer) 180, and the portion of electrode 181 formed in through hole 171, nothing in Sato teaches or suggests that these two portions are formed in different steps. "The wiring 141 is connected to the middle electrode 164 via a through hole 151 and further to the pixel electrode 181 via a through hole 171 and outputs a source voltage of the MOS transistor 1a to the pixel electrode 181" (column 15, lines 2-6). As such, Sato appears to disclose that the electrode 181 itself fills the hole 171. Therefore, Sato does not teach or suggest an embedded conductive layer filled in the contact holes.

Okita, Fukunaga, Miyawaki and Yamazaki do not cure the deficiencies in Sato and are relied upon to teach features other than those discussed above. Although Fukunaga allegedly teaches an embedded conductive layer made of ITO or ZnO (page 7, Paper No. 0704), Fukunaga does not teach or suggest that the portion of electrode 181 formed in the third metal layer (wiring layer) 180 of Sato could or should be formed

in a different step than the portion of electrode 181 formed in through hole 171. Therefore, Sato, Okita, Fukunaga, Miyawaki and Yamazaki, either alone or in combination, do not teach or suggest an embedded conductive layer filled in the contact holes.

Since Sato, Okita, Fukunaga, Miyawaki and Yamazaki do not teach or suggest all the claim limitations, a *prima facie* case of obviousness cannot be maintained. Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. § 103(a) are in order and respectfully requested.

Should the Examiner believe that anything further would be desirable to place this application in better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,



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